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SEMI-PERMANENT MOSQUITO
CONTROL MEASURES

COLUMBIA NATIONAL FOREST

by
Andy Roth

September 1, 1935.

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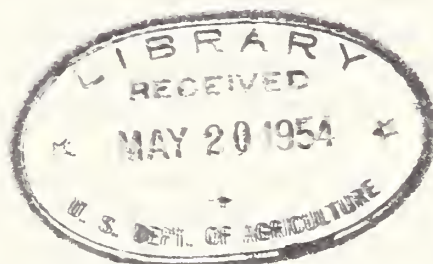
*Columbia National Forest
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SEMI-PERMANENT MOSQUITO CONTROL MEASURES
in the
TWIN BUTTES DISTRICT
of the
COLUMBIA NATIONAL FOREST

by

Andy Roth

Forest Service



Direction

of

U. S. Department of Agriculture
Forest Service and Bureau of Entomology and Plant Quarantine, Cooperating.

K. P. Cecil, Supervisor, Columbia National Forest.
H. H. Stage, Associate Entomologist, Insects Affecting Man and Animals.

Vancouver, Washington

September 1, 1935.

Approved K P Cecil 10/2/35

INTRODUCTION

The mosquito pest found in the Twin Buttes area of the Columbia National Forest lays its eggs on the ground, which is dry eight or nine months of the year. At least one winter season is therefore passed before they hatch when covered with snow water the following spring. For this reason it is considered that with the proper manipulation of water levels a large part of the breeding areas can be controlled. It is held possible that this could be effected in two ways: One, by drawing the temporary accumulation of seepage water accruing along the upper margin of the meadows into the permanent lakes, and another by raising the permanent level of Big Mosquito Lake by means of a dam.

MOSQUITO LAKES AND C C C CAMP AREA

As a beginning project, work was outlined in the Mosquito Lakes area. At the close of the project a small amount of work was done in the C C C Camp Area. The ground was surveyed and a system of ditches was staked. These drainage ditches were so constructed as to accomodate most if not all seepage along the upper margin of the several meadows. Little Mosquito Lake was connected with Big Mosquito Lake by a ditch approximately 800 feet in length. By this means the water level of Little Mosquito Lake was lowered $1\frac{1}{2}$ feet and will serve to draw into the lake proper the temporary accumulations of water which cause an enormous amount of mosquito breeding.

In order to control the breeding meadows surrounding Big Mosquito Lake, a dam 40 feet long and six feet high was constructed across the outlet. This dam will cause a more permanent water level along the margin of the lake, and so prevent alternate drying and flooding of the meadows.

Because of the economies which the use of dynamite has made possible, this method was used in the construction of the ditches. A demonstration was given by Du Pont experts and with some experimentation a method suitable to the kind of ground at hand was developed. The work was started July 15th and was completed August 9th. Approximately 12,076 lineal feet, involving 2,875 cubic yards of ditches were dug in 942 man-hours during this period. Four thousand seven hundred and fifty pounds of 50% special ditching powder was used, at a cost of \$940.00. It is recognized that the amount of work done, considering the amount of powder used, is not particularly a good average, but it is the best that could be done with the type and dryness of the soil with which we had to work. In addition to the correction of seepage conditions, the Steamboat Creek water course was changed approximately one mile by a 35 foot construction of dam and then by diverting the water into a new creek to flow into Big Mosquito Lake instead of entering Mosquito Creek below the mouth of the lake.

Of the 12,076 lineal feet of ditch dug by dynamite, 1,292 feet were dug in the meadow between Squaw Butte and West Butte. This work was about half completed.

THE METHOD USED IN BLASTING

The Du Pont system of blasting was used. This consisted of a series of overlapping craters, each crater being formed by charges of powder so arranged that they overlapped and were exploded simultaneously. This explosion resulted in a ditch having sides at an angle of about 45 degrees. The size of the ditch depended on the wetness of the ground, the amount of powder used and the distance between the sticks of powder.

An important thing to consider in the propagation method described above is the moisture content of the ground. The wetter the ground, the better are the results. In some instances where the ground was quite dry a larger amount of powder was necessary and the sticks had to be placed closer together. As explained, the distance between the charges varied considerably. However, it was found that half sticks of 50% powder spaced about 16 inches apart were usually effective. Electric caps were used and they proved to be reasonably safe and easy to handle.

For a crew of a dozen men, such as was employed during the last days of the project, the following tools and procedure were used:

- 8 men - Punching holes with grubbers
- 1 man - Carrying powder with a knapsack
- 2 men - Loading, by placing dynamite sticks in the holes and crowding them down with cedar sticks.
- 2 men - Handling brush-hooks
- 1 man - Acting as shooter

The length of the blast varied from 3 feet up to 800 feet, depending on the size of the ditch required.

Since there is always a possibility of injury through the use of dynamite, some mention should be made that in future work of this kind particular care should be given to following explicitly the few simple rules suggested by the Powder Company. We were fortunate in having no accidents on this project.

BENEFITS TO BE EXPECTED OF THE WORK

It is expected that the several large ditches constructed will prevent the temporary accumulations of seepage water during the early spring to the extent that mosquito breeding will be reduced to a minimum in those areas treated. At the same time it is expected that the rising of the water level of the Big Mosquito Lake will prevent the deposition of mosquito eggs along those margins.

In addition to the affects of the work on mosquito reduction, the increase in water area of Big Mosquito Lake will have beneficial influence on fish and wild fowl conditions.

The drainage effected in the Little Mosquito Lake vicinity will increase the available pasturage some 25 acres. Pot-holes, a hazard for stock, were eliminated and five bridges were constructed across the ditches so that stock could cross conveniently.

PERMANENCY OF THE WORK PERFORMED

All types of ditches of course require a certain amount of maintenance each year. The ditches constructed in the areas covered by this report, however, will probably require a minimum of such work, since the ground is particularly heavy and will not be subjected to a great deal of erosion. Mr. Elmer Johnson, engineer of the Columbia National Forest, states that it will require approximately 100 man-hours each year to maintain the ditches in good form. A certain amount of work is expected early in the spring of 1936. This is necessary, since the ditches at that time will be doing their optimum work and it is possible that a few of them should be opened up or constructed in some different manner than at present.

LABOR RECORD

Date	Man Hours	No. of Men
7/23	2	2
7/24	21	3
7/25	21	3
7/26	26	6
7/27	4	2
7/29	98	14
7/30	91	13
7/31	91	13
8/1	91	13
8/2	91	13
8/5	84	12
8/6	84	12
8/7	84	12
8/8	84	12
8/9	70	10
<hr/>		
15 Days	942 Hours	144

Average no. of men per day -----9.6
 One foreman for----- 15 days

COST OF WORK

Dynamite, 4,750 pounds-----	\$940.00
Blasting caps, 180 @ .06¢-----	10.80
Foreman, 15 days-----	83.00
C C C Camp labor, 134.5 man days, 7 per day @ 2.00-----	269.00
<hr/>	
Total costs-----	\$1302.80

CHAPTER 10

The first part of the chapter discusses the importance of the study of the history of the United States. It is a study of the past, but it is also a study of the present. The history of the United States is a story of the struggle for freedom and the pursuit of the American dream. It is a story of the triumph of the human spirit over adversity. The study of the history of the United States is a study of the values that have shaped the nation and the values that we must continue to cherish.



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SUMMARY OF DITCHING
(See Appended Maps)

<u>Ditch No.</u>	<u>No. of Feet.</u>	<u>Lbs. of Powder.</u>	<u>Average Size.</u>
1	17	8	6x3x2
2	66	28	"
3	60	20	"
4	658	240	"
4A	215	90	"
4B	54	20	"
5	787	400	"
5A	446	150	"
5B	250	92	"
6	100	40	"
7	35	15	"
7A	16	8	"
7B	25	10	"
8	798	450	8x4x2
8A	298	100	6x3x2
8B	383	121	"
8C	347	133	"
8D	173	68	"
8E	345	129	"
8F	342	187	"
8G	339	135	"
8H	363	160	"
8I	420	130	"
9	1511	607	"
9A	63	18	"
9B	25	8	"
9C	120	62	"
10	385	171	"
11	1065	389	"
11A	185	56	"
11B	236	80	"
11C	122	65	"
11D	532	150	"
12	330		3x2x2
12A	158)	200	"
12B	212)		"
13	266)	200	"
13A	193)		"
13B	133)		"
Total 12,076		4,750	

SUMMARY

Semi-permanent mosquito control measures have been started in the Twin Buttes area of the Columbia National Forest. This work has been practically completed in the vicinity of the Mosquito Lake Guard Station and half completed in the CCC Camp Area.

Two types of work have been accomplished: 1, construction of seepage ditches in the upper meadows surrounding Little Mosquito Lake, which will prevent accumulations of seepage water in early spring; and 2, construction of a dam across the outlet of Big Mosquito Lake, which will serve to stabilize the water level of that lake.

Twelve thousand and seventy-six lineal feet of ditch, involving 2,875 cubic yards of dirt, were dug.

Costs for the project were:	Dynamite-----	\$ 940.00
	Blasting caps-----	10.80
	Foreman-----	83.00
	CCC labor-----	<u>269.00</u>
		\$ 1302.80

Forty acres of ground were actually drained and 600 acres of mosquito breeding ground were affected by the operation.

The work performed will not only have a decided influence on the amount of mosquito breeding, but will also increase the area suitable for trout two or three times, and will extend the available pasture by some 25 acres.

The work should be inspected with the first melting snow in 1936 for the purpose of observing the run-off and note for subsequent correction any defect in the present system of ditches.

Mosquito Lake, meadow area before ditching.



Same area after completion of ditches by dynamite.





Proposed stake line of connecting channel between Big and Little Mosquito Lakes.



Completed ditch 1483 feet in length.



Punching holes and setting charges of dynamite in the East meadow.



Section of completed ditch No. 4.



Slashing underbrush in order to punch holes, Little Mosquito Lake.



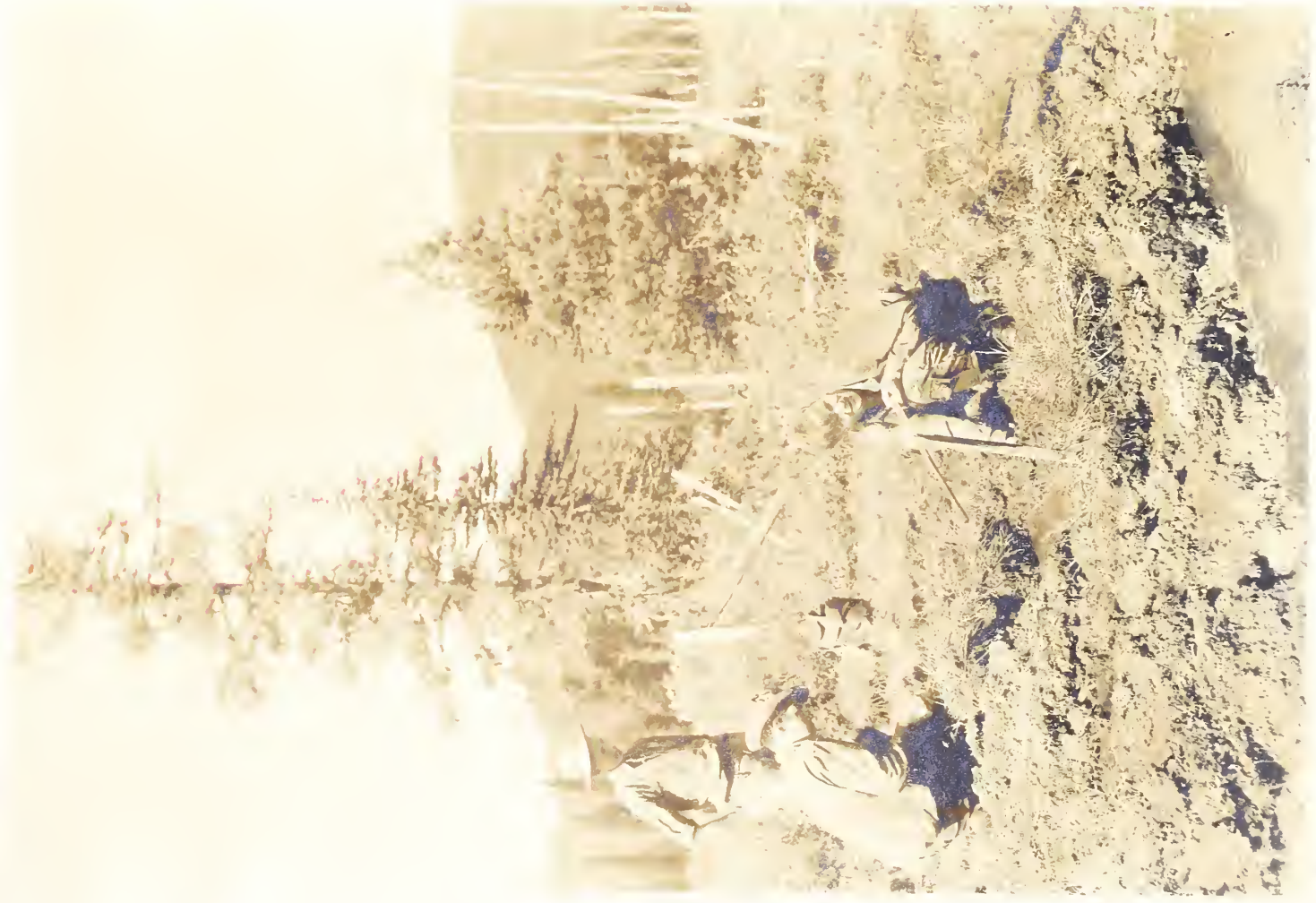
An eight hundred foot charge. Ditch No. 9.



Setting charges of dynamite along stake line in the West meadow Ditch No. 8



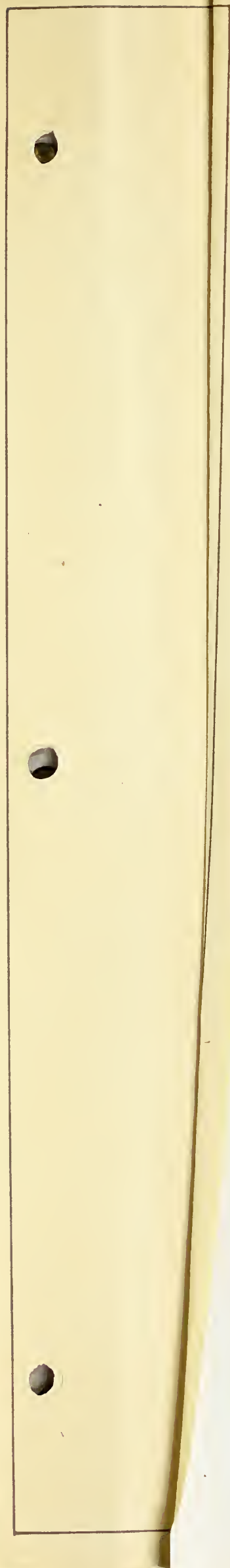
Completed ditch 3808 feet in length.

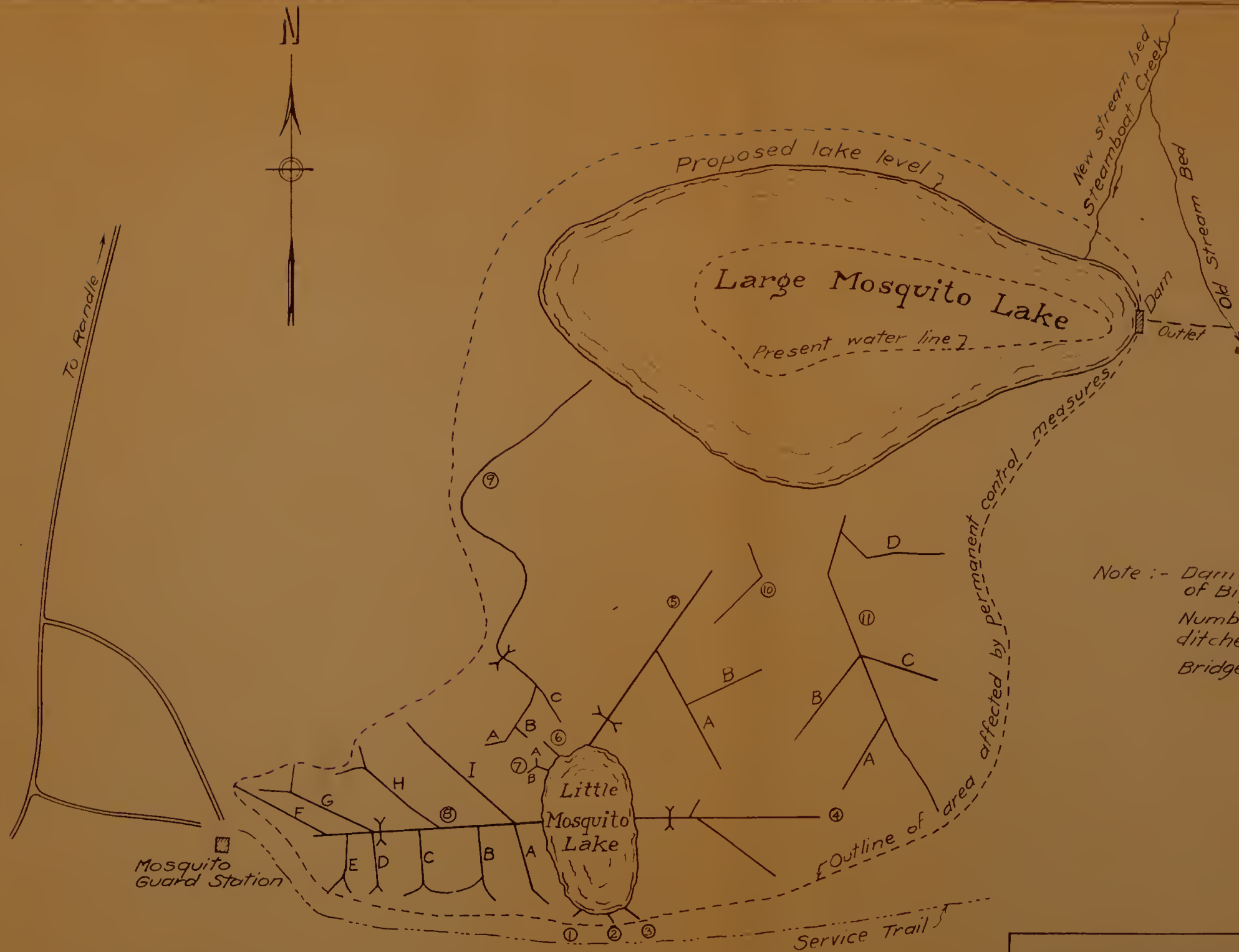


Limiting dyamite necessary to blasting outlet from
rot hole.



Subsidiary ditch draining rot hole into the main
channel.





Ditch	Length
#1	17
#2	66
#3	60
#4	227
#5	1483
#6	100
#7	76
#8	3808
#9	1719
#10	385
#11	2140
Total	10,781 ft.

Note :- Dam constructed at outlet of Big Mosquito Lake.
 Numbers in circles show ditches dug by dynamite.
 Bridges shown thus X

SEMI-PERMANENT MOSQUITO CONTROL MEASURES **MOSQUITO LAKES AREA**

Sept. 1935.

Scale: 1 in. 400 ft.

Field work by Elmer Johnson



DITCH #12

Primary	330 ft.
"A" Lateral	158 ft.
"B" Lateral	212 ft.
Total	700 ft.

DITCH #13

Primary	266 ft.
"A" Lateral	193 ft.
"B" Lateral	133 ft.
Total	592 ft.

SEMI-PERMANENT MOSQUITO
CONTROL MEASURES
C.C.C. CAMP AREA
Sept. 1935. Scale: 1 in. = 400 ft.

Field work by Elmer Johnson.

